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## ARCHERFISHES IN THE NORTHERN TERRITORY

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### Introduction

The Archerfishes (family *Toxotidae*) are a small group of Perciform fishes which inhabit the mangrove estuaries and freshwater streams of South East Asia and nearby regions. The genus *Toxotes* contains all six of the currently recognised species, the distributions of which are summarised below (Allen, 1978).

*Toxotes blythi* — Burma.

*Toxotes chaterius* — Widespread throughout S.E. Asia, including India, Malaysia, Thailand, Vietnam, Singapore, Sumatra, Borneo, New Guinea, and Northern Australia.

*Toxotes jaculator* — S.E. Asia and Indonesia generally, also Philippines, New Guinea, and several South Pacific islands. Although reported from Darwin and N.W. Australia, the only reliable Australian records appear to come from northern coastal Queensland.

*Toxotes lorentzi* — Irian Jaya and Northern Territory, Australia.

*Toxotes microlepis* — Thailand, Sumatra, Borneo.

*Toxotes oligolepis* — Mollucca Islands, Irian Jaya, and Western Australia (Kimberleys).

This article deals with two species (*T. chaterius* and *T. lorentzi*) which occur in the Northern Territory. Information is provided on the distribution, habitat, and behaviour of these fishes, including a new locality record for *T. lorentzi*.

### General

The Archerfishes, or Riflefishes as they are sometimes known, are famous for their peculiar habit of securing food. When a prey item is spotted above the water, such as an insect flying overhead or resting on a reed, the fish rises to the surface and "shoots" it down by forcefully ejecting a pellet of water from the mouth. The prey is then seized at the water surface and eaten.

To accomplish this amazing feat the archerfish has a specially adapted palate with a deep longitudinal groove. When the gill covers are suddenly compressed, water is forced from the pharynx into this canal under pressure, to be shot out of the mouth. The tongue is pressed against the palate during this operation and acts as a regulatory valve (Smith, 1945). Using this technique, the fish can accurately hit its prey from a distance of over a metre.

The habit of shooting water to secure prey appears to be confined to fishes of the family *Toxotidae*. Several old references, however, credit the long nosed butterfly fishes of the genus *Chelmon* (a group of marine Chaetodontids) with the same ability, but lack of any recent evidence seems to refute this claim. These fishes inhabit coral reefs, and the long snout is an adaptation for reaching food in narrow crevices and holes, rather than for shooting water.

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Four species of archerfishes occur in tropical Australia. *Toxotes jaculator* and *T. oligolepis* are yet to be reliably recorded in the Northern Territory. Although they may well occur here, they are not discussed in this article. The remaining two species, *T. chaterius* and *T. lorenzi* may be readily distinguished by a number of morphological features, which are compared below:

***Toxotes chaterius***

Dusky grey colour, with 6 or 7 black spots on the upper side of the body. Soft dorsal, caudal and anal fins sometimes black.

Lateral line curved anteriorly.

Large body scales.

Body and fins flared posteriorly.

***Toxotes lorenzi***

Pale brown, all fins greyish. Several faint darker bands on body.

Lateral line nearly straight.

Small body scales.

Body streamlined.

***Toxotes chaterius* (Hamilton)**

This ubiquitous archerfish attains a standard length of up to 400 mm. Much variation in colour and pattern exists throughout its large range. In some specimens, the body spots are extended into vertical bands whilst in others, they are greatly reduced. Specimens from the inland streams and rockholes of the N.T. have a great deal of black on the dorsal and posterior parts of the body and fins, and look quite different from the more coastal forms. Juveniles exhibit a distinctive white spot on the anterior dorsal surface.

This species occurs in mangrove fringed estuaries along the entire N.T. coastline, penetrating far inland in all the major rivers and freshwater streams. Allen (1978) records its presence up to 200 km inland in the Roper, Edith, and King rivers.

It is a surface swimmer, and is usually seen cruising about the mangrove or pandanus fringes of our waterways. Due to its surface dwelling habit, this is a very obvious fish to even the casual observer, and visitors to places such as Berry Springs and Katherine Gorge spend countless hours watching and feeding these interesting fishes.

Despite its small size, it is regarded as a fine food fish, and can be readily caught on a lure. Live grasshoppers are, however, a sure fire bait when angling for this species.

***Toxotes lorenzi* Weber**

This fish has been commonly referred to as the "primitive" archerfish, and was placed in a separate genus (*Protoxotes*) by Weber and de Beaufort (1936) because of its apparently primitive morphology (lack of distinctive markings, small scale size, straight lateral line, and streamlined body). However, there is really little scientific evidence to support this theory and Taylor (1964) relocated it to the genus *Toxotes*. Its present distribution, however, could indicate that of relict populations.

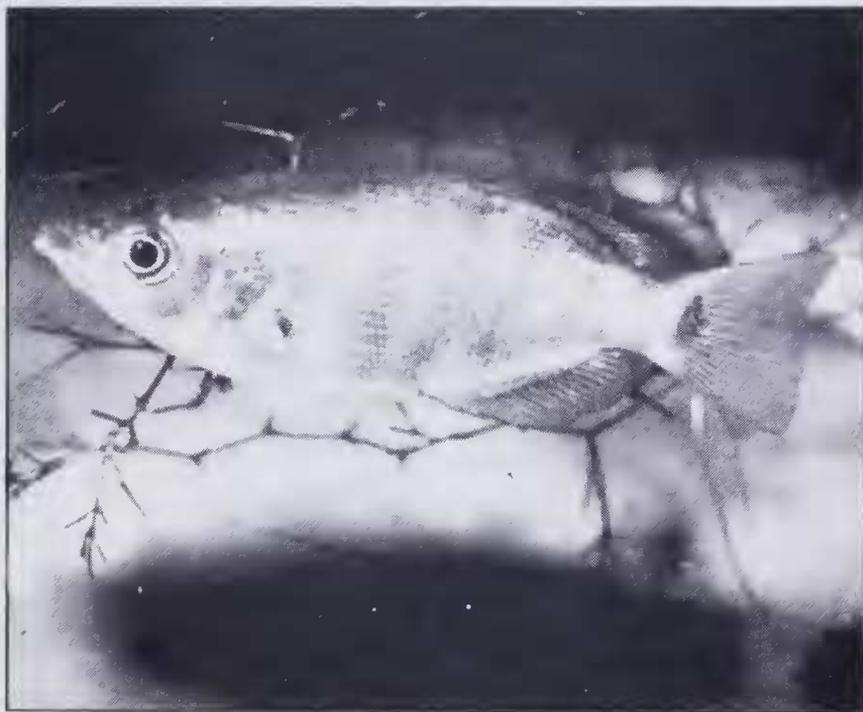
This species is probably the most poorly known of the genus. Described in 1911 from "a freshwater pool near Merauke, South New Guinea" (Weber, 1911), it is known in Irian Jaya only from the Merauke River, and in the vicinity of Balimo.

Its presence in Australia was first reported in 1950 (Whitley, 1950) from Yam Creek, a tributary of the upper Adelaide River, N.T. During the Alligator Rivers Fact

Finding Study of 1973, it was collected from three localities in the South Alligator River drainage system — Sawcut Gorge, Deaf Adder Gorge, and Baroalba Springs (Pollard, 1974). These are all clear, upland rockpools at the base of the Arnhem Land and escarpment, which were found to contain a number of other highly localised fish species. The species has also been collected in Long Harry's Billabong, downstream of Sawcut Gorge in Nourlangie Creek (F. Hubbard, pers comm).

Recently, several Darwin aquarists brought to my attention the occurrence of *T. lorenzi* in Scotch Creek, a tributary of the lower Adelaide River. My wife and I decided to investigate these reports, and on 25/4/81 we located a population of *T. lorenzi* in Scotch Creek just below the Woolner Road crossing, where we managed to collect a living specimen.

This locality is a vastly different habitat to that of the South Alligator sites, all of which are isolated, sheltered upland rockpools of clear, permanent water. They are little affected by seasonal changes. On the other hand, the Scotch Creek site is virtually on the Adelaide River floodplain. It is open, muddy, and severely affected by seasonal flooding and drying out. That this fish can tolerate these apparently extreme habitat variations is an indication that the species may have previously had a much larger range in Australia.



Primitive Archer Fish — Photo P. Horner.

### Behaviour

The following information is summarised from the author's unpublished research (Martin, 1981) and other personal observations.

Under experimental conditions, both species of N.T. archerfishes exhibit very similar behavioural patterns. These fishes spend a large proportion (63% in *chaterus*, 79% in *lorenzi*) of their daylight activities engaged in cruising on the water surface at a depth of less than three centimetres.

Other activity units are generally associated with securing food. Most food is captured at or near the surface, and is generally comprised of insects such as grasshoppers, dragonflies, ants and flies. However, occasional forays are made at depth, where the fishes prey on crustaceans and other invertebrates, particularly young prawns (*Macrobrachia spp.*).

The habit of firing pellets of water to knock down insects has been described briefly in the introduction, and in detail in Smith (1945). To effect a shot, the fish tries to approach its prey as closely as possible, and ideally, directly below the prey item. The fish has very little flexibility in its mouth parts so to line up a potential target, it must alter its body angle, or "trim", in the water for accurate shooting.

There are two very distinct methods employed in shooting prey:

1. The "Power Shot" is usually a long range shot, intended to knock prey into the water. It is accompanied by an audible sound of water expulsion. This shot is used when the fish is certain that a prey item is present, and intends to capture it.
2. The "Washing Shot" is used where the suspected prey item is close enough to the water's edge that it can be "washed" into the water by a succession of light, fanning sprays. This shot is also used to test if a particular search image is, in fact, a prey item.

The washing shot is therefore something of an exploratory shot, and if there is no movement in the suspected prey item, the fish will lose interest and depart.

Archerfishes also use another quite spectacular method of securing prey. From a standing start near the surface, the fish orients its body so that the head is pointing towards the prey and the tail is dipped such that the fish is "standing on its tail" just below the water surface. With a rapid flick of the body, the fish jumps out of the water to capture a prey item overhead. The fish then side-flops back into the water, where the prey is eaten.

On one occasion, a *T. lorenzi* was observed to leap 60 cm from the water to capture a dragonfly. Prey items which are large, such as this, are probably difficult to catch using the water shooting technique, so the fish leaps. It was also noted that by using this method, the fishes were also able to capture insects on the wing, a feat which would be very difficult to achieve by water shooting. Using a variation on technique, archerfishes are also able to capture prey which were close to the water's edge, and could not be shot down. The fish will actually beach itself, grab the prey, then flick back into the water.

The "Leaping Capture" appears to have a high success rate for capturing food compared with the shooting techniques. Strangely, it does not seem to have been recorded in the literature previously.

H. K. Larson (pers comm) informs me that during field studies at Victoria River, N.T., archerfishes were frequently found caught in gill nets which were raised about one metre above the water when not in use. The fishes presumably leapt into the nets when attempting to capture insects which had landed there.

### Conclusion

*Toxotes chaterus* is a common fish throughout its range and is of no economic importance. Therefore, its continued existence in the N.T. would seem to be assured. *Toxotes lorenzi*, however, due to its very restricted known range, must be regarded as a potentially endangered species. Fortunately, its major distribution falls well within the Kakadu National Park, and its survival in this area would seem to be safe.

The Scotch Creek population has no such guarantee. This area is an example of the Top End's coastal wetland habitat and as such, it is a haven for many kinds of wildlife. However, the recent construction of a badly engineered culvert on the Woolner road at Scotch Creek has caused havoc with the freshwater environment. Countless thousands of native fishes (and other freshwater wildlife) died there in the early dry season of 1981 whilst attempting to negotiate the culvert and reach the permanent freshwater billabongs upstream. Unless this situation is rectified, the Scotch Creek population of *T. lorenzi* (along with numerous other freshwater animals) is threatened.

Archerfishes are easily kept in the home aquarium, and make fascinating subjects for the garden pond. In captivity they will accept normal fish foods, but generally prefer live insects. They are quite tolerant of other fish species in the same aquarium, and will live for many years with little maintenance.

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